TOY WATER GUN

TECHNICAL FIELD

This invention relates to toy water guns, and specifically to water guns having an expandable pressure tank.

BACKGROUND OF THE INVENTION

Water guns which eject a stream of water have been a very popular toy for children. These guns have been designed to eject the stream of water in a number of ways. The most common method of ejecting water has been by a manual pump coupled to the trigger of the gun. The pump is actuated by the mere pressure exerted by one finger of an operator upon the trigger, thus the pump typically cannot generate enough pressure to eject the water a lengthy distance. Additionally, these types of pumps work on the actuation of a compression piston which creates single, short bursts of water. However, many children desire the production of an extended stream of water.

Water guns have also been designed with small electric pumps which expel a stream of water from a tube coupled to the pump, as shown in U.S. Pat. Nos. 4,706,848 and 4,743,030. However, these small electric pumps typically cannot eject the stream of water a lengthy distance.

Toy water guns have also been developed which eject a stream of water by exerting pressure on the water within the gun greater than that of ambience and controlling the release of water through a control valve. The water is expelled from the gun due to this pressure difference. The pressurization of the water has been achieved in a variety of manners. U.S. Pat. No. 3,197,070 illustrates a water gun wherein pressure is applied to the water by collapsing a water storage area. Similarly, U.S. Pat. No. 4,854,480 illustrates a water gun wherein water is forced into an elastic bladder which expands to maintain the water under pressure.

Lastly, water guns have been designed with manual pumps which force water or air from a storage reservoir to a pressure reservoir, as shown in U.S. Pat. No. 5,150,819. The conveyance of the water or air into the pressure tank compresses the air therein, thereby exerting pressure on the water within the storage tank. However, as water is released from the pressure tank the volume occupied by the air increases. This increase in volume causes the air pressure within the pressure tank to decrease rapidly, thus resulting in a decrease in water pressure and a weaker projected water stream. Another potential problem associated with this type of water gun is that since the pressure tank is typically constructed of a hard plastic, the accidental striking of the pressure tank may cause it to crack or rupture. This problem is even more likely to occur when the interior of the plastic pressure tank is stressed under high pressure.

Accordingly, it is seen that a need remains for a water gun which can generate a long, steady stream of water and which is not easily ruptured. It is to the provision of such therefore that the present invention is primarily directed.

SUMMARY OF THE INVENTION

In a preferred form of the invention a water gun comprises a housing, a storage reservoir adapted to hold liquid and an expandable pressure tank adapted to hold liquid and to expand upon depositing liquid therein so as to exert a force upon the liquid. The water gun also has a pump for drawing liquid from the storage reservoir and depositing the drawn liquid into the expandable pressure tank. Conduit means are included for conveying liquid from the expandable pressure tank to ambience and control means for controlling the flow of liquid therethrough.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a water gun embodying principles of the invention is a preferred form.

FIG. 2 is a side view, shown in partial cross-section, of the water gun of FIG. 1.

FIG. 3 is a cross-sectional view of an alternative embodiment of the expandable pressure tank of the water gun shown in FIG. 1.

DETAILED DESCRIPTION

With reference next to the drawings, there is shown a water gun **10** having a housing **11** in the shape of a gun with a barrel **13**, a handle **14** and a stock **15**. The gun **10** has a trigger **17**, a removable liquid storage tank or reservoir **18** coupled to the stock **15**, an expandable or resilient liquid pressure reservoir or tank **19** mounted to the stock, and a conventional nozzle **21** mounted to the end of the barrel **13**. The storage tank **18** has a threaded neck **23** threadably mounted within a threaded receptor **24** within the housing and an opening or port **22** in which is removably mounted a filling cap **25**. The receptor **24** has a spring biased check valve or vent **26** which allows air to enter storage tank **18**. The pressure tank **19** has a plastic outer shell **29** and an elastic, expandable inner bladder **30** mounted within the outer shell **29** in fluid communication with the storage tank **18**. The bladder is preferably made of an elastic material such a rubber. The bladder is shown in phantom lines in FIGS. **1** and **2** in an unpressurized, unexpanded, relaxed configuration and in FIG. **2** in a pressurized, expanded, tensioned configuration in solid lines.

As shown in FIG. **2**, the gun **10** has a liquid pump **32** having a handle **33** slidably mounted to barrel **13**. The handle **33** is coupled to a piston **34** slidably mounted within a cylinder **35**. The cylinder **35** and piston **34** define a chamber **38**. A flexible intake tube **36** extends from storage tank **18** to an inlet of pump **32**. A flexible outlet tube **37** extends from an outlet of pump **32** to a T-shaped connection **40**. A tube **41** extends from the T-shaped connection **40** to pressure tank **19**. Intake tube **36** is coupled to a check valve **43** which restricts the flow of liquid to storage tank **18**. Similarly, outlet tube **37** is coupled to a check valve **44** which restricts the flow of liquid to pump **32**. A flexible delivery tube **45** extends from the T-shaped connection **40** to nozzle **21**. A pivotable trigger pinch bar **47** is coupled to trigger **17** and a spring **48**. The spring **48** biases pinch bar **47** against delivery tube **45**. A stop **49** is positioned against delivery tube **45** opposite pinch bar **47**.

In use, the liquid storage tank **18** is filled with a liquid, hereinafter referred specifically to as water W, either by removing it from the stock **15** and filling it through neck **23** or by removing filling cap **25** and pouring water into the tank through opening **22**. Should the storage tank be removed for filling it is subsequently threadably remounted to the stock.

The pump handle **33** is then reciprocally moved so as to actuate piston **34** through cylinder **35**. The movement of the piston **34** within the cylinder **35** has two-cycle strokes, a priming stroke where water is drawn forth from the storage tank **18**, and a compression stroke wherein water is displaced by the piston **34**. The priming stroke starts when the piston **34** is retreated within its cylinder **35** to create an elongated volume chamber **38**. The vacuum created by the